ECM group

March 15, 2006

Peter Van Alyea 50 Professional Center Drive, Suite 100 Rohnert Park, CA 94928

Re: Well Replacement

Redwood Oil Company Service Station

1100 Bennett Valley Road

Santa Rosa, CA

Dear Mr. Alyea:

ECM Group (ECM) has prepared this workplan to replace the deep monitoring well (MW-15) at the above-referenced site (Figures 1 and 2, Appendix A). ECM proposes to: properly destroy multi-level well MW-15; and to install 4 conventional monitoring wells as a replacement. The replacement monitoring wells will be named MW-15A through MW-15D. The replacement is necessary because MW-15 has been found to be defective.

MW-15 is a multi-level well with screened ports at the following depths:

30 ft - 40 ft bgs

60 ft - 70 ft bgs

83 ft - 93 ft bgs

140 ft - 150 ft bgs

The well casing for MW-15 is composed of multi-channel tubing, which enables the placement of up to seven separate sampling ports in a single well. Details of multi-channel tubing and well construction are included in the July 29, 2005 well installation report.

While preparing the Fourth Quarter, 2005 Monitoring Report, cumulative laboratory analytical data for MW-15 was analyzed. An examination of the data showed that, over four consecutive monitoring events, results for the shallow port (30 ft - 40 ft bgs) are practically identical with results for the deepest port (140 ft - 150 ft bgs). This raised the possibility that there could be cross-communication between the two ports.

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On February 16, 2006, field testing was conducted to confirm whether cross-communication between the ports was occurring. It was observed that, when water was pumped from the deep sampling port, water level in the shallow sampling port dropped rapidly. This confirms that cross-communication is occurring between the two ports.

Based on the above observations, it was concluded that all data collected from the shallow sampling port and the deep sampling port of MW-15 is invalid. No cross-communication was observed between the two remaining sampling ports (60 ft - 70 ft bgs and 83 ft - 93 ft bgs). However, the entire well is now compromised and all data from the well should be considered unreliable.

SCOPE OF WORK

The following outlines the scope of work and procedures to be used for this investigation:

- 1.) Prepare a site-specific safety plan for this investigation.
- 2.) Properly destroy multi-level well MW-15.
- 3.) Install 4 conventional monitoring wells (MW-15A, MW-15B, MW-15C, and MW-15D) at the location shown on Figure 2 (Appendix A).
- 4.) Develop the newly-installed monitoring wells.
- 5.) Survey the top-of-casing elevations of the newly-installed monitoring wells.
- 6.) Sample the new and existing wells in accordance with the existing site monitoring program. Analyze the samples for TPPH(G), TPH(D), BTEX, and oxygenates.
- 7.) Report the results.

Each of these tasks is described below.

Task 1 - Site Safety Plan

Using available site history information, ECM will prepare a site-specific safety plan. The site safety plan (SSP) identifies potential site hazards and specifies procedures to protect site workers. The SSP will be on-site during field operations. The SSP is included as Appendix C.

Task 2 - Well Destruction

MW-15 will be destroyed under appropriate permit. The well will be overdrilled. All well construction materials (casing, sand, bentonite, grout) will be removed. One of the replacement wells will be installed in the resulting borehole. To avoid cross-contamination between formations at different depths, well installation shall be performed with continuously-installed steel casing, using air rotary techniques.

Task 3 - Well Installation

Proposed locations for MW-15A, MW-15B, MW-15C, and MW-15D is shown on Figure 2 (Appendix A). Wells will be screened at the same depths as the screen intervals for MW-15, as follows:

MW-15A	30 ft - 40 ft bgs
MW-15B	60 ft - 70 ft bgs
MW-15C	83 ft - 93 ft bgs
MW-15D	140 ft - 150 ft bgs

To avoid cross-contamination between formations at different depths, well installation shall be performed with continuously-installed steel casing, using air rotary techniques. A 4.5 inch

diameter borehole will be drilled. At 20- to 40-foot intervals, a 6.25-inch diameter steel casing will be inserted over the 4.5-inch borehole, creating a tight seal between borehole wall and the outside of the steel casing. A boring log was generated during the installation of MW-15, so no logs will be generated and no soil samples will be collected.

When the target depth is reached, the well is constructed within the casing in accordance with ECM Standard Operating Procedures - Monitoring Well Installation (Appendix B). After well construction, the 6.25 diameter steel casing is removed.

Prior to drilling, utilities will be located by USA and a private underground utility detection company. The wells will be drilled by a California licensed drilling contractor.

Task 3 - **Develop the Newly Installed Monitoring Wells**

The newly installed monitoring well will be developed in accordance with ECM Standard Operating Procedures - Well Development (Appendix B). The well will be developed no sooner than 48 hours following well construction, in order to allow the cement grout to set.

Task 4 - Survey the Top-of-Casing Elevation of Newly Installed Monitoring Wells

The top of casing elevations of the newly installed monitoring well will be surveyed by a licensed land surveyor using an established USGS benchmark.

Task 5 - Sample the Site Wells

New and existing site wells will be sampled in accordance with the existing site monitoring program.

Task 6 - Report the Results

A letter report presenting the results of this investigation will be completed within 45 days of completion of the field work.

Thank you for allowing ECM to provide environmental consulting services to Redwood Oil Company. Please call if you have questions or require additional information

Sincerely, ECM Group



Jim Green Project Manager

Attachments:

Appendix A - Figures

Appendix B - ECM Standard Operating Procedures

Appendix C - Site Safety Plan

cc: Joan Fleck, North Coast Regional Water Quality Control Board

APPENDIX A FIGURES

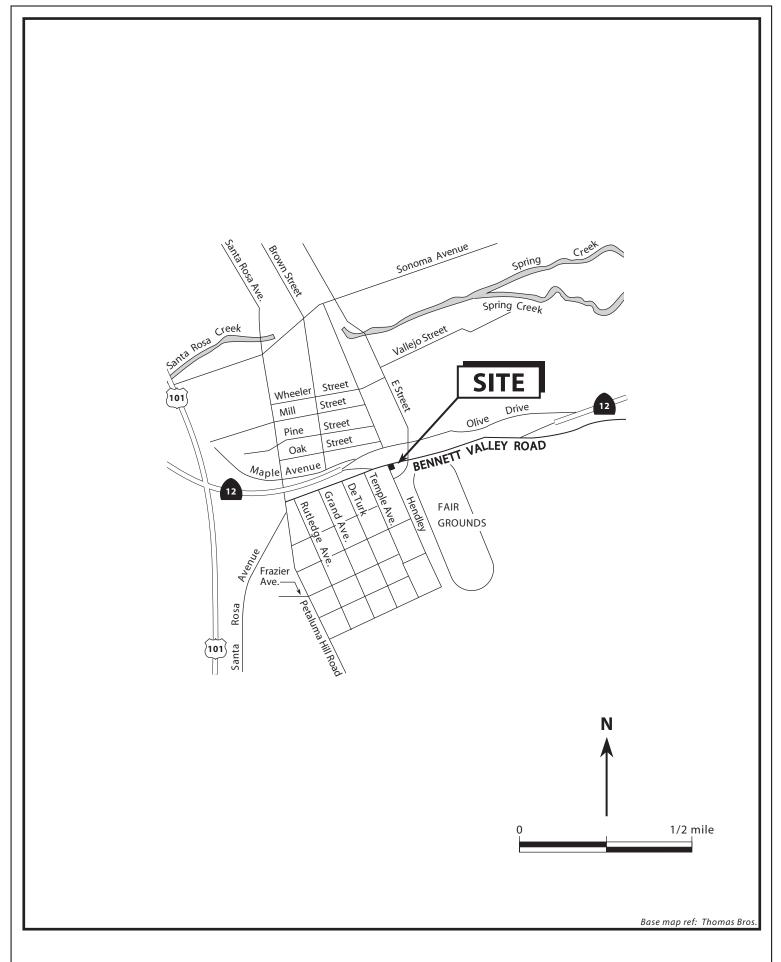


Figure 1. Site Location Map - Redwood Oil Service Station, 1100 Bennett Valley Road, Santa Rosa, California

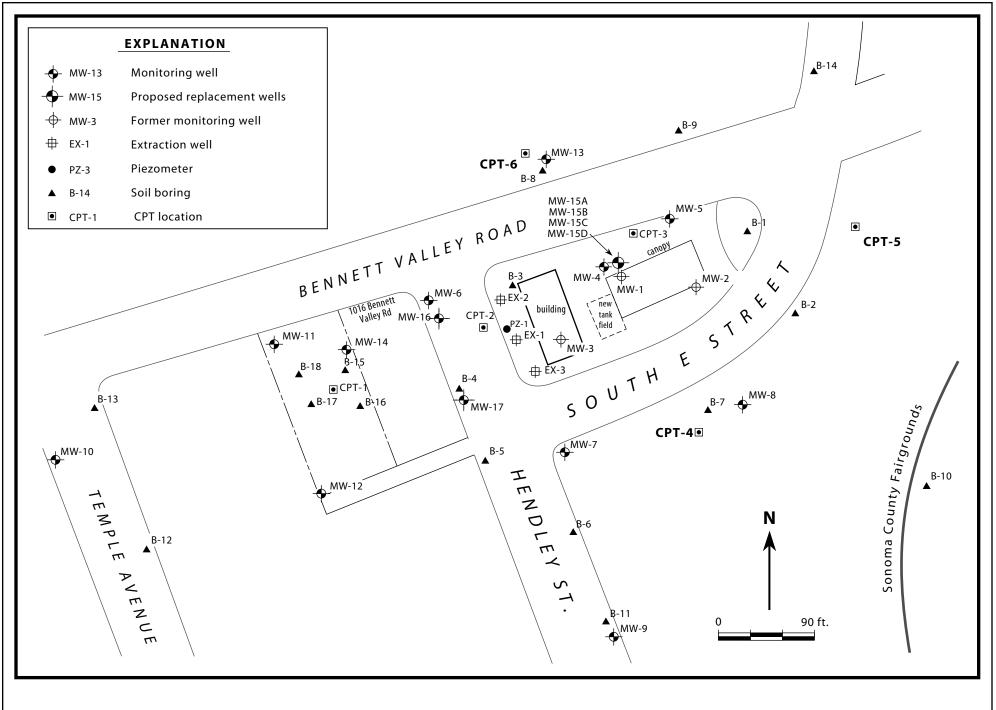


Figure 2. Location of Proposed Replacement Wells - Redwood Oil Service Station #106, 1100 Bennett Valley Road, Santa Rosa, California

APPENDIX B
Ecm Standard Operating Procedures

ECM STANDARD OPERATING PROCEDURE

MONITORING WELL DESIGN AND CONSTRUCTION

Where possible, information from published and unpublished reports is reviewed prior to installation of monitoring wells. Relevant data includes highest and lowest anticipated ground water elevations, aquifer materials, aquifer yield and contaminants expected. This information is used to aid the field geologist rather than to predetermine how the wells will be constructed. Well construction is based on *site specific conditions* and is determined in the field after discussion with the senior geologist.

Monitoring wells are constructed with flush-threaded, 2-inch or 4-inch diameter, slotted PVC, stainless steel or teflon well screen and PVC, stainless steel or teflon blank casing. Number 3 or #212 sand is used in the annular space around the well screen. The sand is placed into the annular space around the well screen to approximately 2 feet above the top of the well screen. If high ground water conditions exist, the sand may be placed 0 to 1 foot above the top of the well screen. Two feet of bentonite pellets are used to separate the sand from the sanitary surface seal (grout). If high ground water conditions exist 1/2 foot of bentonite may be used to separate the sand from the sanitary surface seal.

The grout (Portland cement with approximately 3-5% bentonite powder) is poured into the annular space above the bentonite pellets. If the surface seal is greater than 5 feet thick, grout consisting of cement mixed with 3-5% bentonite powder will be tremied or pumped into the annular space above the bentonite pellets to prevent the infiltration of surface water into the well. If the surface seal is less than 5 feet thick, the grout will be poured from the surface. The resulting seal will be checked for shrinkage within 24 hours and additional grout will be added, if necessary. The surface seal is used to prevent infiltration of surface water into the well.

The monitoring well(s) is locked with a stovepipe or cap and covered with a traffic-rated vault if it is located in a developed area. The well ID is clearly marked on the cap or casing.

ECM STANDARD OPERATING PROCEDURE

WELL DEVELOPMENT

ECM develops ground water monitoring wells not less than 48 hours after the placement of the surface seal (grouting) to allow sufficient time for the cement grout to set. The wells are developed to restore the natural hydraulic conductivity of the formation(s) to be monitored and to remove all sand and as much fine-grained material as possible.

Prior to development, ECM field personnel measure the depth to water and the total depth of the well. The total depth measurement is compared to the well completion diagram shown on the field log and any discrepancies are noted.

Well development consists of several cycles of surging and evacuation of water in the well, each ending with measurements of temperature, pH, conductivity, and observation of turbidity. Surging takes place for several minutes to loosen fines from the screened interval. The vented surge block is placed block several feet below the water surface and pulled upward.

Development shall continue for a period of at least four hours or when ten well volumes have been removed, whichever occurs first, and until ground water removed from the well is clear and visibly free of suspended materials. Note the time and the approximate volume of water removed prior to each determination of the following parameters (and whether well is bailed or pumped dry): pH, temperature, and specific conductivity. These measurements should be made a minimum of five times during well development.

If micro wells (well diameter 3/4" or less) are installed, the well may not be surged. In this case, a minimum of twenty casing volumes will be removed.

If the water is still cloudy after the four hour period but these three parameters have stabilized, then the well will be considered developed regardless of the volume of water purged from the well. Stabilization of pH, temperature, and specific conductivity will be considered to have occurred when these parameters undergo changes not exceeding ± 0.1 , 0.5 degrees F, and 5 percent, respectively.

After development is completed, the depth to water and the total depth of the well are remeasured. The total depth of the well and the total depth noted on the field log should be approximately the same. All data measured during the procedures described herein are recorded on the ECM Well Development Form, which is part of the project file.

The ground water removed from the wells during development remains onsite in 55-gallon Department of Transportation-approved drums. The water is removed by a licensed hauler and taken to an approved disposal facility.

APPENDIX C SITE SAFETY PLAN

ECM SITE SAFETY PLAN

A. GENERAL INFORMA	ΓΙΟΝ					
PROJECT NO: <u>98-511-66</u>						
PROJECT MANAGER: Jim Gr	PROJECT MANAGER: Jim Green DATE PREPARED: March 15, 2006					
SITE LOCATION: 1100 Benn	ett Valley Road, San	ta Rosa, CA				
SCOPE/OBJECTIVE OF WOR	K: Well destruction/i	nstallation_				
PROPOSED DATES OF FIELD	ACTIVITIES: week	of March 27, 2006				
BACKGROUND INFORMATIC	N: [X] Complete	[] Preliminary (no ana	alytical data available)			
DOCUMENTATION/SUMMAF	RY:					
Overall Chemical Hazard	[] Serious [] Low	[X] Moderate [] Unknown	Criteria for Determination Historical data	:		
Overall Physical Hazard:	[] Serious [] Low	[X] Moderate [] Unknown	Criteria for Determination Site conditions	:		
B. SITE/WASTE CHARA WASTE TYPE(S):	CTERISTICS	[X]Solid	[] Sludge	[X] Gas/Vapor		
CHARACTERISTIC(S):	[] Flammable/Igni [] Explosive	table [X] Volatile [] Reactive	[] Corrosive [X] Carcinogen	[] Acutely Toxic [X] Toxic		
PHYSICAL HAZARDS:	PHYSICAL HAZARDS: [] Overhead [] Confined Space [] Below Grade [X] Trip/Fall [] Puncture [] Burn [] Cut [X] Splash [X] Other Drilling Equipment					
SITE HISTORY/DESCRIPTION	I AND UNUSUAL FEA	ATURES: Active Service S	Station. Drilling will take p	place in active area of		
service station. Be aware of	service station traffi	ic, Use cones/barriers to k	eep customers from exclu	sion zone. Soil Bin will		
be on Hendley Blvd. Use cau	ution when transport	ing soil or equipment to a	nd from bin/staging area.			
LOCATION OF CHEMICAL/W	ASTES: bin located	on Hendley Blvd.				
ESTIMATED VOLUME OF CH	IEMICAL/WASTES: s	several yards				

C. HAZARD EVALUATION

LISTS HAZARDS BY TASK. (Cross-reference task numbers in Section D).
Task 1: Drilling/Well installation/destruction
Task 2: Soil/equip transport across station to bin/staging area on Hendley.
Task 3:
Task 4
CUENCAL HAZARE FLATION

CHEMICAL HAZARD EVALUATION:

Compound	Action Levels* ppm STEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
Benzene	2.5/0.5	Inhalation/Dermal	Confusion, euphoria, vomiting, dizziness	1-5 ppm	Aromatic
Toluene	75/50	Inhalation/Dermal	Confusion, euphoria, vomiting, dizziness	1-5 ppm	Aromatic
Ethylbenzene	60/50	Inhalation/Dermal	Confusion, euphoria, vomiting, dizziness	1-5 ppm	Aromatic
Xylenes	75/50	Inhalation/Dermal	Confusion, euphoria, vomiting, dizziness	1-5 ppm	Aromatic
					Pleasant

^{*} Action level is defined as 50% of both the Short Term Exposure Limit and the Time Weighted Average Exposure Limit. Units are parts per million in air. STEL = Short Term Exposure Limit. TWA = Time Weighted Average Exposure Limit (8-hour period).

D. SITE SAFETY WORK PLAN

SITE CONTROL: [x] Perimeter Identified? [x] Site Secured? [x] Work Area Designated? [x] Zone(s) of Contamination Identified?

Perimeter, work area, and zone of contamination will be identified at such time as impacted material is encountered.

ANTICIPATED LEVEL OF PROTECTION (cross-reference task numbers in Section C):

	А	В	С	D
Task 1				Х
Task 2				Х
Task 3				
Task 4				

MODIFICATIONS:

Level C PPE will be used if any action level is exceeded. However, levels cannot exceed 10 times the action level. Level B PPE will be used if 10 times the action level is exceeded.

<u>Drilling Safety:</u> Note: Safe operation of drilling equipment is the responsibility of the Construction contractor. Use of all equipment, including drill rig, forklift, etc. will be in a safe manner keeping safety of station patrons in mind.

<u>Personnel Safety:</u> All site personnel involved in handling impacted soil and/or ground water will be trained in accordance with 29 CFR 1910.120 and/or Title 8, Section 5192 of the California Code of Regulations.

AIR MONITORING EQUIPMENT:

Air monitoring equipment used on-site will be limited to the following:

- Sensidyne air pump and detector tube system for measuring benzene
- OVM/Data logger (Model 580B) manufactured by Thermo Environmental Instrument Inc. to detect volatile compounds in soil, and to perform ambient air surveys.

The calibration procedures for air monitoring equipment are stated below. Calibration will be conducted daily prior to any field surveys.

Sensidyne Air Pump:

Since the detector tube system is sensitive to the amount of air pulled through the reaction tube, the pump will be periodically checked for air volume and flow rate (every 4 hours). The pump will be leak tested each time it is used, this will be done by placing an intact tube in the pump and placing negative pressure on the system. The pump should hold the negative pressure for about one minute.

OVM (580B):

A factory-prepared standard of 100 ppm isobutylene is used as the calibration standard. The OVM is connected to the standard gas with polyethylene tubing and draws the standard gas at its operating rate. The standard gas may also be used to inflate a Tedlar air sampling bag, which is then used as a source for the OVM calibration. The OVM instrument is factory programmed to calibrate itself to the known concentration of isobutylene. The zero point is calibrated to the ambient air.

AIR MONITORING:

Contaminant	Type of Sample Area (A), Personal (P)	Monitoring Equipment	Frequency of Sampling
Benzene	A,P	Sensidyne analyzer tubes	Once during every new soil intrusive activity or during water sampling. Every hour or as field conditions change.
Organic Vapors	A,P	OVM	Once during every new soil intrusive activity or during water sampling. Every hour or as field conditions change.

- Air monitoring for benzene will be instituted if OVM readings indicate an excess of 100 ppm. Frequency of air monitoring will be increased to once every one-half hour when STEL/TWA action levels are exceeded. Frequency of air monitoring may be reduced to once every hour after two sampling periods indicate that both organic vapors and benzene concentrations are below the STEL/TWA action levels.

RECORD OF AIR MONITORING:

Date	Time	Type of Sample Area (A), Personal (P)	Contaminant/Equipment	Measurement Recorded & Units

PERSONAL ATMOSPHERIC HAZARD GUIDELINES:

For Community Safety Concerns refer to Section G

Instrument	Frequency	Exposure/Level† (ppm)	Action for Site Workers
Sensidyne with benzene tubes	Every hour*	Short-term/ < 0.5 Long-term/ < 0.5	Continue investigation
		Short-term/ > 0.5 Long-term/> 0.5	Upgrade personal protection equipment (PPE) to Level C with organic vapor cartridges
		2 ppm for more than 15 minutes	Withdraw from area, and reassess conditions. Urinary phenol test on employees.
OVM (580B)	Every hour and when strong odors are present	< 100 ppm	Continue investigation
		100 - 225 ppm	Continue investigation with caution*
		Short-term/ <u>></u> 375 Long-term/ <u>></u> 225	Continue investigation upgrade site workers PPE to Level C
		> 500 ppm for more than 15 minutes	Discontinue site investigation pending a reassessment of the conditions

^{*} Air monitoring for benzene will be instituted if OVM readings indicate an excess of 100 ppm.

DECONTAMINATION SOLUTIONS AND PROCEDURES FOR EQUIPMENT, SAMPLING GEAR, ETC.: All sampling equipment which comes into contact with the soil undergo standard sampling equipment decontamination procedures. All rinseate generated will be contained and labeled at the property pending final disposal.

PERSONNEL/DECONTAMINATION PROTOCOL: If contaminated soil is encountered, use disposable gloves, leave on-site in drums

SPECIAL SITE EQUIPMENT, FACILITIES, OR PROCEDURES (sanitary facilities and lighting): N.A.

GENERAL SPILL CONTROL, IF APPLICABLE: All liquid spills will be contained with absorbent materials and placed in a steel drum for future disposal.

INVESTIGATION-DERIVED MATERIAL DISPOSAL: (If contaminated soil is encountered, use tyvek, disposable gloves. Place tyvek, gloves and disposable sampling equipment in a plastic liner and place in a steel DOT-approved 17-H 55-gallon drum.

[†] Short-term is for exposures of 15 minutes or less. Long-term is for exposures of greater than 15 minutes.

EMERGENCY ROUTES:

FIELD TEAM ME	MBERS	RESPONSIBILITY
E EMERGENCY INFORMA	TION	
AMBULANCE:	911	
HOSPITAL:	546-3210	
POISON CONTROL CENTER:	911	
POLICE:	911	
FIRE DEPARTMENT:	485-3308 or 911	
AGENCY CONTACT:	NCRWQCB 576-2220	
EMERGENCY CONTACTS:	Project Manager: (Name)	Jim Green
	(Office)	751-0655

Proceed North on E Street to Sonoma Avenue: turn right (east) on Sonoma Ave. to Brookwood: turn left (north) on

Brookwood to Montgomery Dr.: turn right (east) on Montgomery Dr. and proceed to hospital.

F. EQUIPMENT			
Instrumentation (If needed, the f	ollowing will be supplied	ed)	First Aid Equipment
OVM	1	First Aid Kit	✓
Draeger Pump, Tubes	1	Portable Eyewash	
LEL Meter		Fire Extinguisher	✓
Temp/pH/EC Meter			
Decon Equipment (if needed, the	e following will be supp	lied)	
Wash Tub	✓	Detergent	✓ Type Liquinox
Buckets	✓	Distilled Water	
Scrub Brushes	1	55-gallon DOT Drums	✓ <u> </u>
Steam-cleaner	1		
Sampling Equipment (If needed,	the following will be su	upplied.)	
Brass Tubes	✓	Teflon/PVC Bailers	✓
Teflon Tape	✓	Plastic Baggies	✓
Plastic Caps	✓	Ice Chest	✓
40-ml VOAs	✓	Blue Ice	✓
1 L Bottles	1		
Miscellaneous Equipment			
Tool Kit		Caution Tape	✓
Traffic Safety Vests		Mobile Telephone	
Traffic Cones		Plastic Sheeting	✓
Sidewalk Closure Signs			
G. COMMUNITY SAFETY	CONCERNS		
Community Safety Hazards:			
✓ Noise	✓ Tripping	Splash	Fire
✓ Vapors/Fumes	✓ Traffic	Оргаот	
		<u> </u>	
Close proximity of public to drilli	ng acitivities.		
Mitigation of Community Safety measures will be taken:	Concerns: If hazardous	s soil is encountered or v	vapors fumes result from work, the followin
	\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \		
Fence	Vapor suppress	sant Fans	x Signs
х		х	
Traffic Control:			

Potential exposure to petroleum hydrocarbons during field activities is limited to site workers, and the population in the surrounding areas. An air monitoring program in conjunction with limiting access to areas near the work zones greatly diminishes the possibility of exposure to volatile hydrocarbons. During non-work hours, the site perimeter will be a minimum

six-foot wire fencing with one strand of barbed wire. All gates will be secured with a chain and lock.

If airborne concentrations exceed specific action levels (page 2) contingency response actions will be taken immediately to reduce potential exposure to the public. Ambient background levels of volatile organic compounds, benzene, and particulate lead will be established prior to and after site construction activities. Air monitoring equipment (page 3) is used to screen the ambient upwind and downwind work areas. The same chemical screening may be applied to various areas of the contamination reduction zone. Total volatile organic compounds, benzene, and other solvents will be measured via direct reading instrument from grab samples (page 5). Atmospheric hazard guidelines and action to be taken have been summarized in the table on page 8.

In the event emission levels exceed levels of 500 ppm for volatile organic vapors, and/or 2 ppm for benzene, in a period of 15 minutes or more, the following additional actions will be implemented:

- Inform businesses in the immediate area (within 1 block) of the elevated hydrocarbon levels.
- Santa Rosa Fire Department will be notified.

Instrument	Frequency	Type of Sample	Ambient Level	Action for Community
Sensidyne with benzene tubes	Every hour*	Α	2 ppm for 15 minutes	Inform businesses in immediate area, call SRFD for assistance
OVM (580 B)	Every hour and when strong odor is present	А	> 500 ppm for 15 minutes	Inform businesses in immediate area, call SRFD for assistance

^{*} Air monitoring for benzene will be instituted if OVM readings indicate an excess of 100 ppm.

The public will be prevented from entering the work area by a boundary consisting of caution tape and barricades. If vapors during construction exceed the ambient levels shown above, work will cease immediately. All work will be conducted between 7:30 a.m. and 6:30 p.m. to minimize noise impact to the surrounding population.

HAZARDOUS & TOXIC MATERIALS SITE SAFETY REVIEW

GEN	NERAL INFORMATION			
DA [.]	TE	TIME		PROJECT NUMBER 98-511-21
SIT	E LOCATION:			
OB.	JECTIVES:			
TYF	PES OF CHEMICALS ANTIC	IPATED: gas/btex		
TOI	PICS DISCUSSED			
PH	YSICAL HAZARDS: Be awa	are of proximity of publ	lic.	
CHI	EMICAL HAZARDS:			
PEF	RSONAL PROTECTION:			
DEC	CONTAMINATION:			
SPE	ECIAL SITE CONSIDERATION	NS:		
CHI	ECKLIST			
1.	EMERGENCY INFORMATI	ON REVIEWED?	/ AND FAMILIAR	TO ALL TEAM MEMBERS?
2.	LOCATION OF AND ROUT	TE TO NEAREST HOSPI	TAL KNOWN TO	ALL MEMBERS?/ MAP POSTED?
3.	SITE SAFETY PLAN READ	DILY AVAILABLE AND I	TS LOCATION KN	OWN TO ALL TEAM MEMBERS?
4.	MONITORING EQUIPMEN	T CALIBRATED ON THI	S DATE?	
			ATTENDEES	
	NAME			SIGNATURE
ME	ETING CONDUCTED BY:			
SIT	E SAFETY OFFICER			

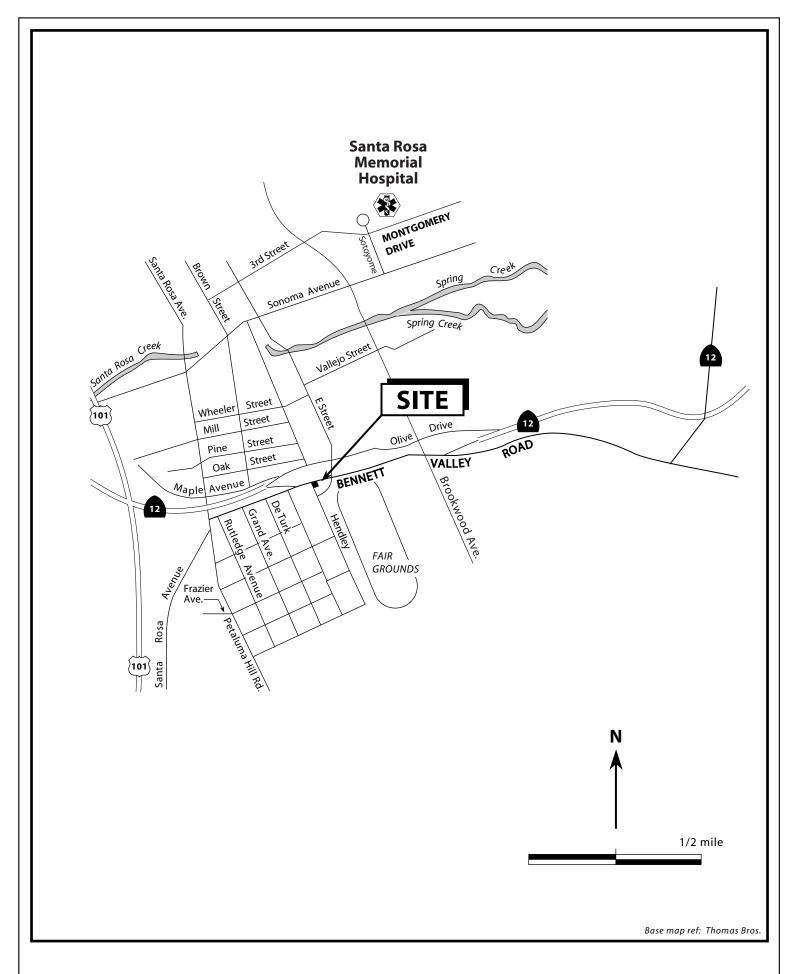


Figure 1. Hospital Route Map - Santa Rosa Memorial Hospital - 1165 Montgomery Drive, Santa Rosa, California